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Demand for Data Puts Engineers in Spotlight

By [STEVE LOHR](#)

In Silicon Valley, the stars have long been charismatic marketing visionaries and cool-nerd software wizards. By contrast, mechanical engineers who design and run computer data centers were traditionally regarded as little more than blue-collar workers in the high-tech world.

For years, they toiled in relative obscurity in the engine rooms of the digital economy, amid the racks of servers and storage devices that power everything from online videos to corporate e-mail systems. Their mission was to keep the computing power plants humming, while scant thought was given to rising costs and energy consumption.

Today, data center experts are no longer taken for granted. The torrid growth in data centers to keep pace with the demands of Internet-era computing, their immense need for electricity and their inefficient use of that energy pose environmental, energy and economic challenges, experts say.

That means people with the skills to design, build and run a data center that does not endanger the power grid are suddenly in demand. Their status is growing, as are their salaries — climbing more than 20 percent in the last two years into six figures for experienced engineers.

“The data center energy problem is growing fast, and it has an economic importance that far outweighs the electricity use,” said Jonathan G. Koomey, a consulting professor of environmental engineering at Stanford. “So that explains why these data center people, who haven’t gotten a lot of glory in their careers, are in the spotlight now.”

At one time, “we were seen as sheet metal jockeys,” said Chandrakant Patel, a mechanical engineer at [Hewlett-Packard Labs](#) who has worked in Silicon Valley for 25 years. “But now we have a chance to change the world for the better, using engineering and basic science.”

There is no letup in the demand for data center computing. [Digital Realty Trust](#), a data center landlord with more than 70 facilities, says that customer demand for new space is running 50 percent ahead of its capacity to build and equip data centers for the next two years. “We’re building the railroads of the future, and we can’t keep up,” said Chris J. Crosby, a senior vice president at Digital Realty.

For every new center, new data center administrators need to be hired. “It takes us eight months to find a guy to run a data center,” said Mr. Crosby.

Indeed, some data managers with only a degree from a two-year college can command a \$100,000 salary. Trade and professional conferences for data center experts, unheard of years ago, are now commonplace. Five-figure signing bonuses, retention bonuses and generous stock grants have become ingredients in the compensation

packages of data center experts today.

Paul Marcoux knows the feeling of being wanted. [Cisco Systems](#), giant Silicon Valley maker of equipment used in data centers, recently held a nationwide search for a vice president for “green engineering.” It needed someone who could manage the traditional information technology functions as well as increasingly important mechanical and electrical systems.

Last November, Cisco found Mr. Marcoux, an electrical engineer with an M.B.A. working at American Power Conversion, a manufacturer of power supplies and air-conditioners for data centers. Mr. Marcoux, 57, worked on the design and construction of about 100 data centers in his 30-year career.

“To really make progress, we have to bridge the analog and the digital worlds,” said Mr. Marcoux.

At Cisco, Mr. Marcoux is applying his experience to improving the company’s data centers and its products, so that its computers increasingly can communicate with the coolers and power generators. “Our products need to talk to the power supplies and air-conditioners instead of being standalone boxes,” he explained.

Cisco is just one of the many companies — and the Energy Department’s Lawrence Berkeley National Laboratory — working on the challenge of making data centers operate more like seamless machines, using sensors and software, for example, so the computers can direct air-conditioners and fans where and what level of cooling is needed.

Mr. Patel is overseeing H.P.’s programs in energy-efficient data centers and technology. The research includes advanced projects like trying to replace copper wiring in server computers with laser beams. But like other experts in the field, Mr. Patel says that data centers can be made 30 percent to 50 percent more efficient by applying current technology.

The pace of the data center buildup is the result of the surging use of server computers, which in the United States rose to 11.8 million in 2007, from 2.6 million a decade earlier, according to IDC, a research firm. Worldwide, the 10-year pattern is similar, with the server population increasing more than fourfold to 30.3 million by 2007.

“For years and years, the attitude was just buy it, install it and don’t worry about it,” said Vernon Turner, an analyst for IDC. “That led to all sorts of inefficiencies. Now, we’re paying for that behavior.”

The problem is that most computers in data centers run at 15 percent or less of capacity on average, loafing the rest of the time, though consuming electricity all the while. (In the old days, when they housed a few large computers, data centers were far more efficient. Mainframe computers run at 80 percent of capacity or more.)

The computers also generate a lot of heat, so much so that half of the energy consumed by a typical data center is for enormous air-conditioners, fans and other industrial equipment used mainly to cool the high-tech facilities.

The nation’s data centers doubled their energy consumption in the five years to 2006, exceeding the electricity used by the country’s color televisions, according to the latest government estimates.

The availability of electricity, not just its cost, presents a threat to the continued expansion of data center computing that can hamper companies across the economy, as they increasingly rely on information technology.

Based on current trends, by 2011 data center energy consumption will nearly double again, requiring the equivalent of 25 power plants. The world's data centers, according to recent study from McKinsey & Company, could well surpass the airline industry as a greenhouse gas polluter by 2020.

Because the task ahead, analysts say, is not just building new data centers, but also overhauling the old ones, the managers who know how to cut energy consumption are at a premium. Most of the 6,600 data centers in America, analysts say, will be replaced or retrofitted with new equipment over the next several years.

They apparently have little choice. Analysts point to surveys that show 30 percent of American corporations are deferring new technology initiatives because of data center limitations.

Mechanical and electrical engineers with experience in data center design, air-flow modeling and power systems management are in demand. "If you have those skills, there are jobs waiting," says Phil Calabrese, a mechanical engineer and director of [I.B.M.](#)'s real estate engineering and construction unit.

No company has longer experience in the care and feeding of data centers than I.B.M., and analysts say improving data center efficiency will involve applying some mainframe-style management disciplines.

To exploit the opportunity, I.B.M., which built its business on mainframes and still sells them, last fall introduced a green data center services unit. The new group signed \$300 million in contracts in the fourth quarter of last year, and the business is growing rapidly this year, the company says.

Now that costs and energy consumption are priorities, the data center gurus are getting a hearing and new respect.

"After 25 years, we're finally elevating mechanical engineering and adding a lot of electrical engineering, computer science and applied physics," said Mr. Patel of Hewlett-Packard. "I wish I were 20 years younger."

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